

## PATENT ABSTRACTS OF JAPAN

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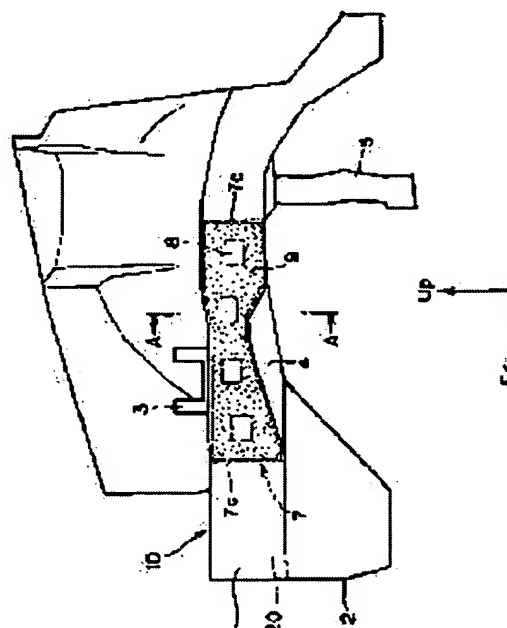
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## (54) REINFORCEMENT STRUCTURE FOR VEHICULAR BODY SKELETON MEMBER

## (57)Abstract:

PROBLEM TO BE SOLVED: To easily control an expansion ratio without generating a part not being rustproofed.

SOLUTION: This reinforcement structure for a vehicular body skeleton member has a foaming material 9 which expands with receiving heat from a drying line at a rust-prevention process of the vehicular body filled in a closed section space 20 of a front side member 10 which consists of a closing plate 2 and a side member panel 1. A bracket 7 with an expanded sheet 8 fixed is placed along a longitudinal direction in the vehicular body skeleton member, and a bulkhead 7c which divides an inside of the front side member 10 is provided at both of tips of the bracket 7.



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CLAIMS

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[Claim(s)]

[Claim 1] In the reinforcement structure of the car-body frame member which comes to fill up the foam which foams in response to the heat of the desiccation line in the rust-proofing process of a car body in the closed section space of the car-body frame member which consisted of an outer panel and an inner panel The reinforcement structure of the car-body frame member characterized by preparing the septum section which divides the interior of a car-body frame member into the ends of this bracket while having arranged the bracket which fixed the foaming sheet along with a longitudinal direction inside a car-body frame member.

[Claim 2] The reinforcement structure of the car-body frame member according to claim 1 which is the frontside member which can scoop out the above-mentioned car-body frame member, and has the section, and is characterized by having arranged the above-mentioned bracket in the direction which intersects this \*\*\*\*\*.

[Claim 3] The reinforcement structure of the car-body frame member according to claim 1 to 2 characterized by performing rustproofing to the foaming sheet root face of the above-mentioned bracket.

[Claim 4] The reinforcement structure of the car-body frame member according to claim 1 to 3 characterized by preparing the hole of extent through which the above-mentioned foaming sheet can pass at the time of foaming between the fixing sections of this foaming sheet while fixing two or more foaming sheets on one side of the above-mentioned bracket at the longitudinal direction.

[Claim 5] The reinforcement structure of the car-body frame member according to claim 1 to 3 characterized by preparing the hole of extent through which the above-mentioned foaming sheet can pass at the time of foaming between the fixing sections of this foaming sheet while fixing two or more foaming sheets by turns to both sides of the above-mentioned bracket at the longitudinal direction.

[Claim 6] The above-mentioned bracket is the reinforcement structure of the car-body frame member according to claim 2 to 5 characterized by having arranged so that a frontside member can be scooped out and the section may be straddled.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the structure which comes to fill up foam in cross-section space, such as a frontside member of the automobile which consists of an outer panel and an inner panel, and a pillar, in more detail about the reinforcement structure of a car-body frame member.

[0002]

[Description of the Prior Art] As this kind of a reinforcement structure, as shown, for example in JP,6-278145,A, the foaming sheet is beforehand pasted up on the inner surface of a car-body frame member, and there is a thing to which this is made to foam with the heat of the desiccation line in the rust-proofing process of a car body.

[0003]

[Problem(s) to be Solved by the Invention] However, if it is in such a reinforcement structure, in order to dip a car body in a rust-proofer after adhesion of a foaming sheet, rustproofing is no longer performed to a part of car-body frame member, i.e., the adhesion side of a foaming sheet. moreover, the trouble that control of expansion ratio, i.e., a hardening consistency, is difficult since it is not easy to fill up with foam only the part which should reinforce a car-body frame member -- although - it is.

[0004] In view of such a situation, a non-rustproofing part is not generated but this invention aims at offering the reinforcement structure of the car-body frame member which can also perform control of expansion ratio easily.

[0005]

[Means for Solving the Problem] This invention for solving the above-mentioned technical problem in the closed section space of the car-body frame member which consisted of an outer panel and an inner panel While arranging the bracket which fixed the foaming sheet along with a longitudinal direction in the reinforcement structure of the car-body frame member which comes to fill up the foam to which it foams in response to the heat of the desiccation line in the rust-proofing process of a car body inside a car-body frame member It is characterized by preparing the septum section which divides the interior of a car-body frame member into the ends of this bracket.

[0006] It is the frontside member which can scoop out the above-mentioned car-body frame member, and has the section, and the above-mentioned bracket may be arranged in the direction which intersects this \*\*\*\*\*.

[0007] Rustproofing may be performed to the foaming sheet root face of the above-mentioned bracket.

[0008] While fixing two or more foaming sheets on one side of the above-mentioned bracket at a longitudinal direction, between the fixing sections of this foaming sheet, the above-mentioned foaming sheet may prepare the hole of extent through which it can pass at the time of foaming.

[0009] While fixing two or more foaming sheets by turns to both sides of the above-mentioned bracket at a longitudinal direction, between the fixing sections of this foaming sheet, the above-mentioned foaming sheet may prepare the hole of extent through which it can pass at the time of foaming.

[0010] The above-mentioned bracket may be arranged so that a frontside member can be scooped

out and the section may be straddled.

[0011]

[Embodiment of the Invention] Hereafter, the example of this invention is explained to a detail, referring to an accompanying drawing.

[0012] Drawing 1 - drawing 6 show the 1st example of this invention. First, when a configuration is explained, the frontside member 10 which consists of a side-member panel 1 and a closing plate 2 can scoop out for avoiding interference with an object with a built-in engine room near the joint of the engine-mount bracket 3, and is owner \*\*\*\*\* to an underside side about the section 4. In the closed section space 20 of the frontside member 10, it arranges so that a bracket 7 can be scooped out and the section 4 may be straddled. This bracket 7 equips plate section 7b order ends with septum section 7c, and has prepared 7d of bending sections also in this septum section 7c while it equips the vertical ends of plate section 7a with bending section 7b (refer to drawing 4 ).

[0013] On the whole, rustproofing is performed to the bracket 7. After using adhesion material for both sides of plate section 7a and pasting up two or more foaming sheets 8 which have heat fizz on a longitudinal direction in the assembly of a bracket 7 (refer to drawing 5 A ), septum section 7c is joined to plate section 7a order ends (refer to drawing 5 B ). And a bracket 7 is arranged so that the frontside member 10 can be scooped out and a suspension member's 5 attaching point may be straddled from the front end of the section 4, and the bending sections 7b and 7d of the plate section 7a and septum section 7c are joined by the inner surface of the side-member panel 1, respectively (refer to drawing 5 C ). that is, the closed section space 20 of the frontside member 10 will be divided into the septum sections 7c and 7c before and behind a bracket 7 by right and left in 4s \*\*, and this field will be filled up with foam 9. In addition, it will foam on the foaming sheet 8 with the heat of the desiccation line in the rust-proofing process of a car body, and it will form foam 9.

[0014] Next, an operation of this example and effectiveness are explained.

[0015] Since the foaming sheet 8 is made to paste up and foam to the comparatively small bracket 7 instead of a car-body frame member like the side-member panel 1 or the closing plate 2, rustproofing before car-body assembly becomes possible on components level, and restoration of foam 9 is attained, without producing a non-rustproofing part in the frontside member 10. Moreover, since the foaming field of the foaming sheet 8 is \*\*\*\*(ed) inside the frontside member 10 by the septum sections 7c and 7c before and behind a bracket 7, it becomes controllable [ the expansion ratio of the foaming sheet 8, i.e., a hardening consistency, ].

[0016] By the way, since it could scoop out with the axis L1 of the front end section and the axis L2 of the section 4 has offset only S, if Load F joins the frontside member 10 from the front at the time of a front collision, the moment M (=F-S) which can scoop out the frontside member 10 and you are going to make it buckle below in the section 4 will produce this frontside member 10 (refer to drawing 6 ). However, since plate section 7a of a bracket 7 is arranged in the lengthwise direction so that it can scoop out and the section 4 may be intersected, plate section 7a of a bracket 7 will receive this moment load in the direction of a field. For this reason, it can scoop out, generating of the crease by the buckling distortion in the section 4 can be controlled, crushing of the front end section of the frontside member 10 can be carried out to the shape of bellows, and the absorption efficiency of collision energy can be raised.

[0017] In addition, in this example, although the foaming sheet 8 is pasted up on both sides of plate section 7a of a bracket 7, as shown in drawing 7 , while pasting up two or more foaming sheets 8 only on one side of plate section 7a, a hole 11 may be formed between the adhesion parts of this foaming sheet 8. If it does in this way, there is little number of the foaming sheet 8, and it ends, the time and effort of adhesion can be saved, but since the foaming sheet 8 passes through a hole 11 at the time of foaming and turns to a background, it is satisfactory to restoration of foam 9.

[0018] Or as shown in drawing 8 , while pasting up two or more foaming sheets 8 on both sides of plate section 7a by turns, the slot 12 prolonged up and down may be formed between the adhesion parts of this foaming sheet 8. If it does in this way, it can be managed even if it does not enlarge a slot 12, and the number of the foaming sheet 8 not only decreases, but can control strong lowering.

[0019] Drawing 9 - drawing 13 show the 2nd example of this invention.

[0020] The frontside member 10 of this example can scoop out for avoiding interference with a tire 13 near the joint of the bracket 3 which mounts an engine 13, and has the section 4 in the side-face

side. Moreover, in the closed section 20 of the frontside member 10, it arranges so that a bracket 7 can be scooped out and the section 4 may be straddled like the 1st example, but the plate section 7a is turned to the longitudinal direction so that it can scoop out and the section 4 may be intersected. Since other components are constituted like the 1st example, the same sign is attached and explanation is omitted.

[0021] Since it could scoop out with the axis L1 of the front end section and the axis L2 of the section 4 has offset only S, if Load F joins the frontside member 10 from the front at the time of a front collision, the moment  $M (= F \cdot S)$  which you can scoop [ moment ] out the frontside member 10 and is going to make it buckle the side in the section 4 will produce the frontside member 10 of this example (refer to drawing 13 ). However, since plate section 7a of a bracket 7 is arranged in the longitudinal direction so that it can scoop out and the section 4 may be intersected, plate section 7a of a bracket 7 will receive this moment load in the direction of a field. for this reason, it can scoop out, generating of the crease by the buckling distortion in the section 4 can be controlled, crushing of the front end section of the frontside member 10 is carried out to the shape of bellows, and the absorption efficiency of collision energy is raised -- things can be carried out.

[0022] In addition, even if it applies this invention to the reinforcement structure near [ as shown in car-body frame members other than frontside member 10, for example, drawing 14 , ] the door waist line of the center pillar 14, equivalent effectiveness is expected with the same configuration.

[0023]

[Effect of the Invention] Since a foaming sheet is made to paste up and foam to a small bracket compared with a car-body frame member according to this invention, rustproofing before car-body assembly becomes possible on components level, and restoration of foam is attained, without producing a non-rustproofing part in a car-body frame member.

[0024] Moreover, since the foaming field of a foaming sheet is \*\*\*\*(ed) by the septum section of a bracket, the interior of a car-body frame member becomes controllable [ the expansion ratio of a foaming sheet, i.e., a hardening consistency, ].

[0025] If it is made a configuration like claim 2, since a bracket 7 will function as prop material to the moment which can scoop out a frontside member and you are going to make it buckle in the section at the time of a front collision, it can scoop out, generating of the crease by the buckling distortion in the section can be controlled, crushing of the front end section of a frontside member can be carried out to the shape of bellows, and the absorption efficiency of collision energy can be raised.

[0026] If it is made a configuration like claim 3, rustproofing will be performed also to a bracket and the rust-proofing effectiveness will become high.

[0027] If it is made a configuration like claim 4, there is few fixing of a foaming sheet, it ends, and time and effort can be saved.

[0028] If it is made a configuration like claim 5, it can be managed even if it does not enlarge a hole, and the number of fixing of a foaming sheet not only decreases, but can control strong lowering.

[0029] If it is made a configuration like claim 6, the part which can scoop out a frontside member and forms the section will be filled up with foam, and it will become advantageous in reinforcement.

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DESCRIPTION OF DRAWINGS

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## [Brief Description of the Drawings]

[Drawing 1] The side elevation showing the reinforcement structure of the 1st example of this invention.

[Drawing 2] The A-A sectional view of drawing 1 at the time of foaming sheet un-foaming [ of this example ].

[Drawing 3] The A-A line sectional view of drawing 1 at the time of foaming sheet foaming.

[Drawing 4] The decomposition perspective view of this example.

[Drawing 5] Drawing explaining the attachment procedure of this example.

[Drawing 6] Drawing explaining effectiveness drawing of this example.

[Drawing 7] Drawing showing the modification of drawing 4 .

[Drawing 8] Drawing showing other modifications of drawing 4 .

[Drawing 9] The plan showing the reinforcement structure of the 2nd example of this invention.

[Drawing 10] The B-B line sectional view of drawing 9 at the time of foaming sheet un-foaming [ of this example ].

[Drawing 11] The B-B line sectional view of drawing 9 at the time of foaming sheet foaming of this example.

[Drawing 12] The decomposition perspective view of this example.

[Drawing 13] Drawing explaining effectiveness drawing of this example.

[Drawing 14] The perspective view showing the application site of the 3rd example of this invention.

## [Description of Notations]

1 ... Side-member panel

2 ... Closing plate

7 ... Bracket

7c ... Septum section

8 ... Foaming sheet

9 ... Foam

10 ... Frontside member

20 ... Closed section

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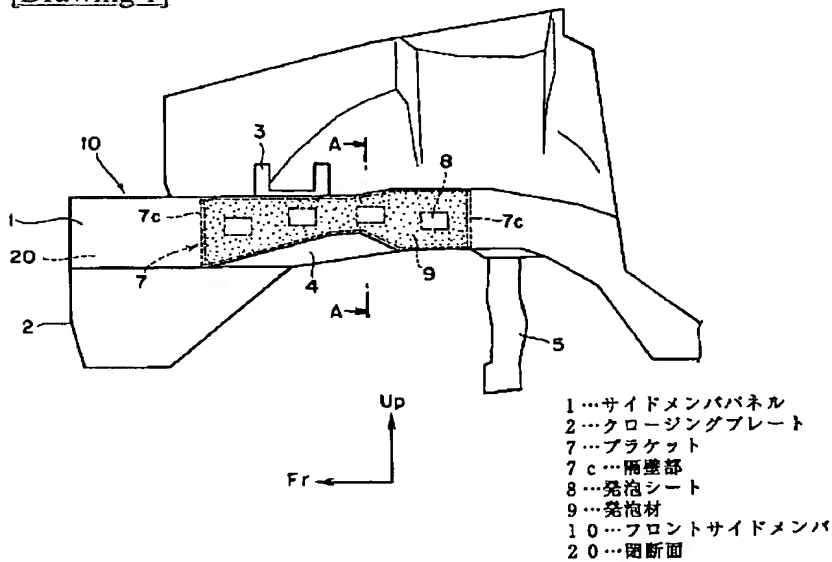
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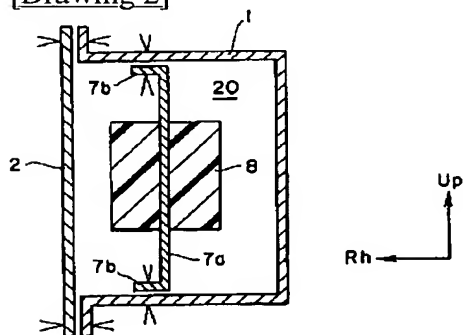
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## DRAWINGS

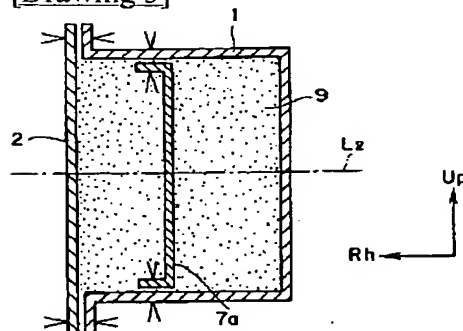
[Drawing 1]



[Drawing 2]

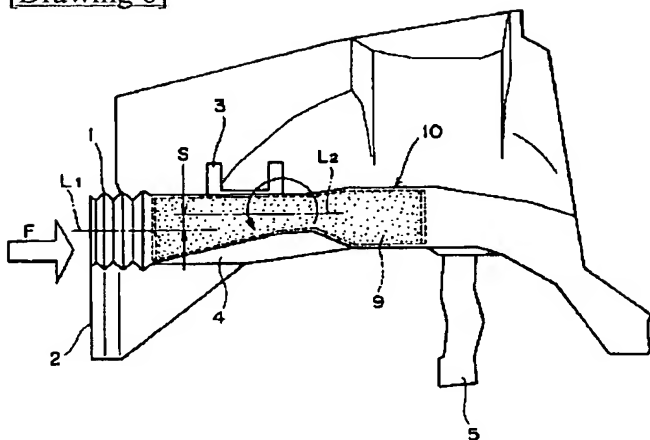


[Drawing 3]

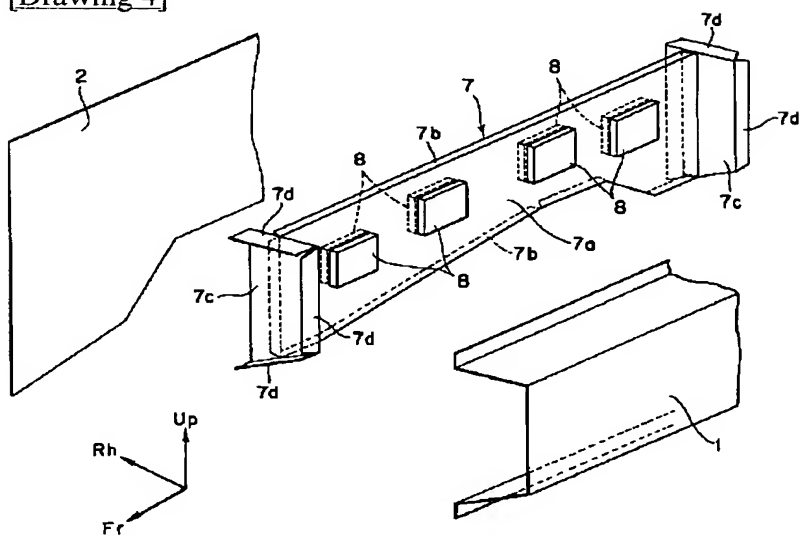




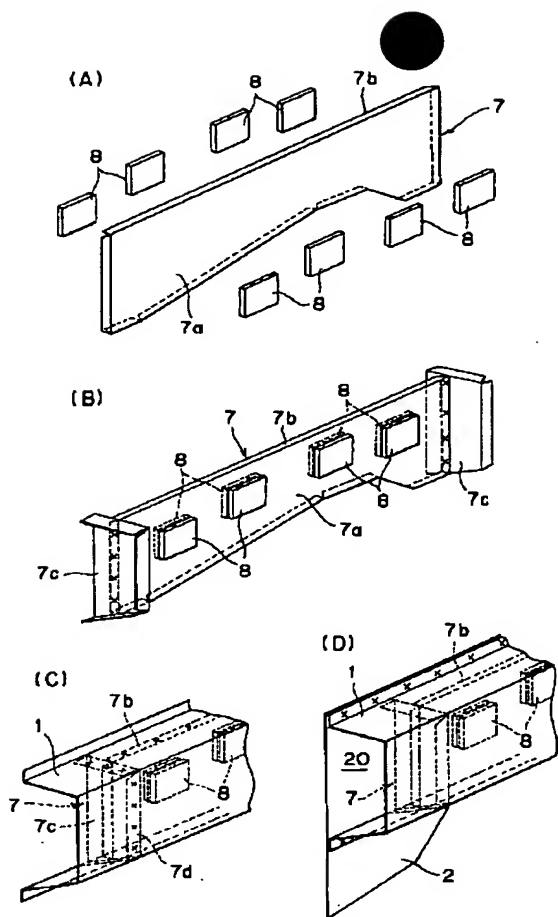
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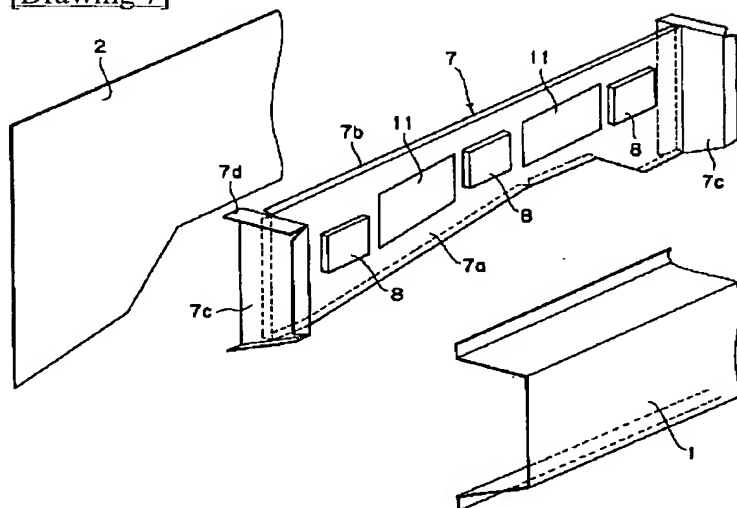
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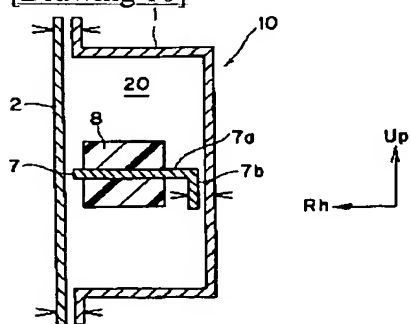
[Drawing 5]



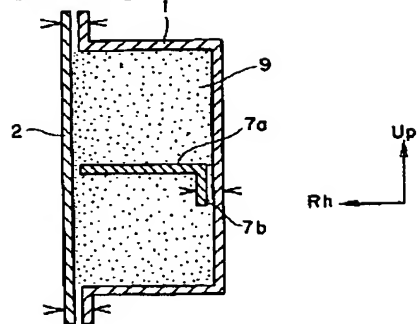
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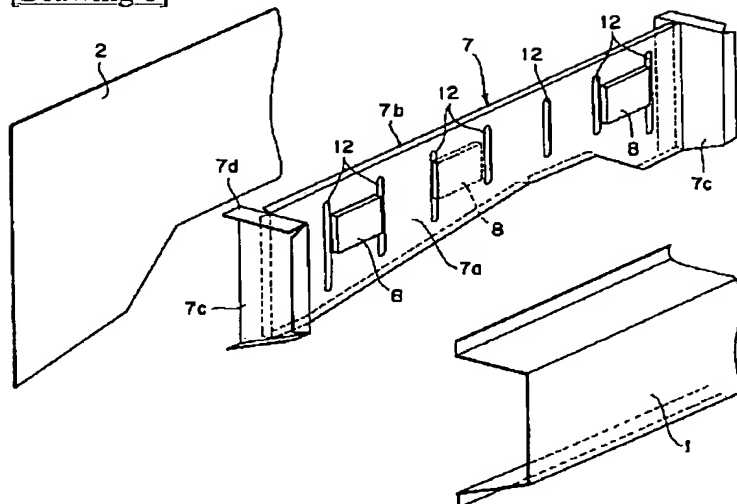
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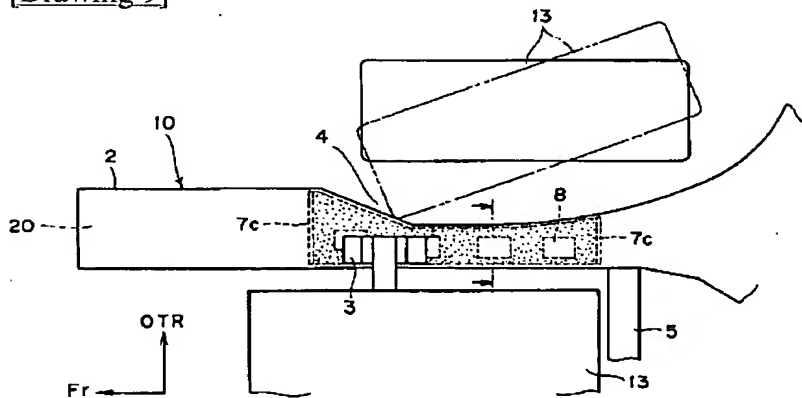
[Drawing 11]



[Drawing 8]

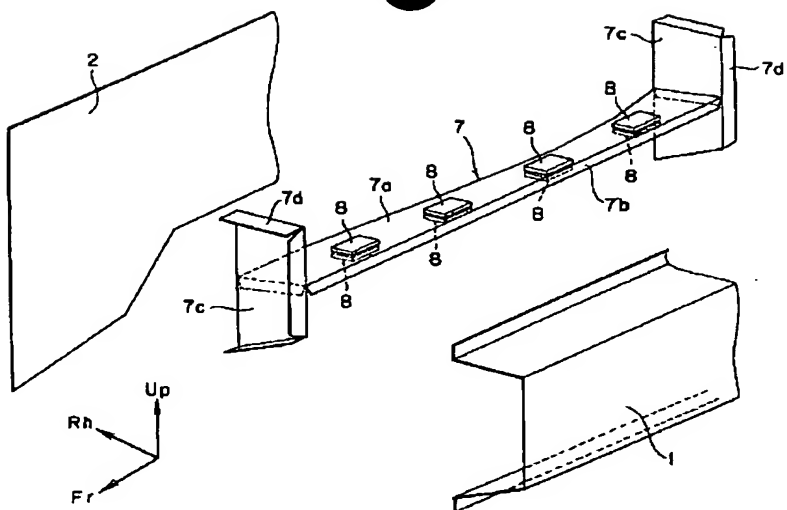


[Drawing 9]

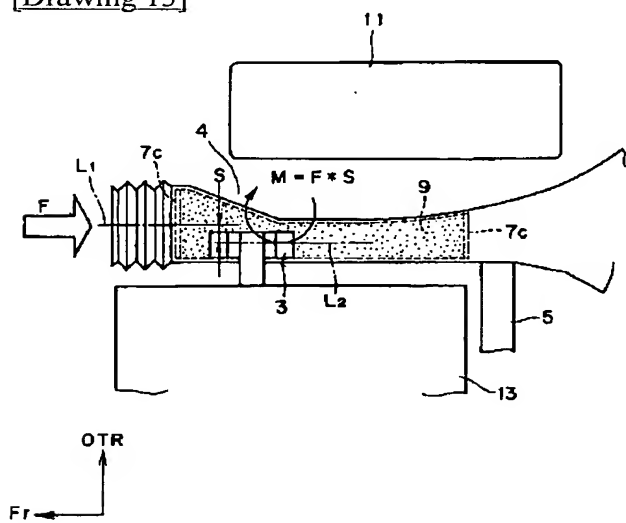


[Drawing 12]

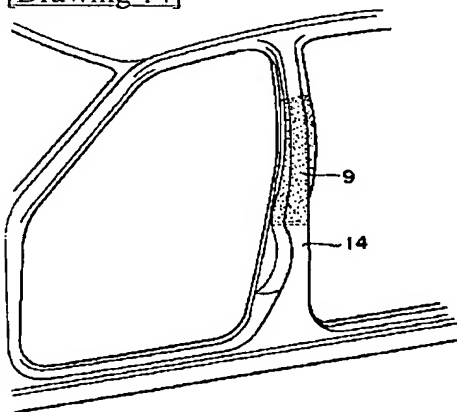




[Drawing 13]



[Drawing 14]



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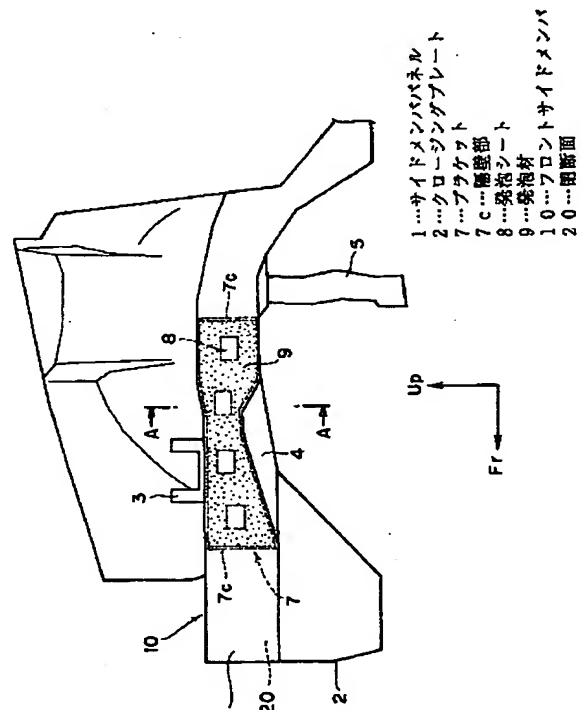
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BB01 CA09

(54)【発明の名称】 車体骨格部材の補強構造

(57)【要約】

【課題】 未防錆処理箇所を生じず、発泡倍率の制御を容易にする。

【解決手段】 クロージングプレート2とサイドメンバパネル1で構成されたフロントサイドメンバ10の閉断面空間20内に、車体の防錆工程における乾燥ラインの熱を受けて発泡する発泡材9を充填してなる車体骨格部材の補強構造において、発泡シート9を固着したブラケット7を車体骨格部材の内部に長手方向に沿って配置するとともに、該ブラケット7の両端にフロントサイドメンバ10の内部を仕切る隔壁部7cを設けてある。



## 【特許請求の範囲】

【請求項1】 アウタパネルとインナパネルで構成された車体骨格部材の閉断面空間内に、車体の防錆工程における乾燥ラインの熱を受けて発泡する発泡材を充填してなる車体骨格部材の補強構造において、発泡シートを固着したブラケットを車体骨格部材の内部に長手方向に沿って配置するとともに、該ブラケットの両端に車体骨格部材の内部を仕切る隔壁部を設けたことを特徴とする車体骨格部材の補強構造。

【請求項2】 上記車体骨格部材がえぐれ部を有するフロントサイドメンバであって、該えぐれ部と交差する方向に上記ブラケットを配置したことを特徴とする請求項1に記載の車体骨格部材の補強構造。

【請求項3】 上記ブラケットの発泡シート固着面に防錆処理を施したことを特徴とする請求項1～請求項2に記載の車体骨格部材の補強構造。

【請求項4】 上記ブラケットの片面に発泡シートを長手方向に複数個固着するとともに、該発泡シートの固着部間には、上記発泡シートが発泡時に通過できる程度の穴を設けたことを特徴とする請求項1～請求項3に記載の車体骨格部材の補強構造。

【請求項5】 上記ブラケットの両面に複数個の発泡シートを長手方向に交互に固着するとともに、該発泡シートの固着部間には、上記発泡シートが発泡時に通過できる程度の穴を設けたことを特徴とする請求項1～請求項3に記載の車体骨格部材の補強構造。

【請求項6】 上記ブラケットはフロントサイドメンバのえぐれ部を跨ぐように配置したことを特徴とする請求項2～請求項5に記載の車体骨格部材の補強構造。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】この発明は車体骨格部材の補強構造に関し、さらに詳しくは、アウタパネルとインナパネルとで構成される自動車のフロントサイドメンバやピラー等の断面空間内に発泡材を充填してなる構造に関する。

## 【0002】

【従来の技術】この種の補強構造としては、例えば特開平6-278145号公報に示すように、車体骨格部材の内面に発泡シートを予め接着しておいて、これを車体の防錆工程における乾燥ラインの熱によって発泡させるものがある。

## 【0003】

【発明が解決しようとする課題】しかしながら、このような補強構造にあつては、発泡シートの接着後に車体を防錆剤に浸すため、車体骨格部材の一部すなわち発泡シートの接着面に防錆処理が施されなくなってしまう。また、車体骨格部材の補強すべき部位のみに発泡材を充填するのは容易でないため、発泡倍率すなわち硬化密度の制御が困難であるという問題点もある。

【0004】本発明は、このような事情に鑑み、未防錆処理箇所が生じず、発泡倍率の制御も容易に行える車体骨格部材の補強構造を提供することを目的とする。

## 【0005】

【課題を解決するための手段】上記課題を解決するための本発明は、アウタパネルとインナパネルで構成された車体骨格部材の閉断面空間内に、車体の防錆工程における乾燥ラインの熱を受けて発泡する発泡材を充填してなる車体骨格部材の補強構造において、発泡シートを固着したブラケットを車体骨格部材の内部に長手方向に沿って配置するとともに、該ブラケットの両端に車体骨格部材の内部を仕切る隔壁部を設けたことを特徴とする。

【0006】上記車体骨格部材がえぐれ部を有するフロントサイドメンバであって、該えぐれ部と交差する方向に上記ブラケットを配置してもよい。

【0007】上記ブラケットの発泡シート固着面に防錆処理を施してもよい。

【0008】上記ブラケットの片面に発泡シートを長手方向に複数個固着するとともに、該発泡シートの固着部間には、上記発泡シートが発泡時に通過できる程度の穴を設けてもよい。

【0009】上記ブラケットの両面に複数個の発泡シートを長手方向に交互に固着するとともに、該発泡シートの固着部間には、上記発泡シートが発泡時に通過できる程度の穴を設けてもよい。

【0010】上記ブラケットはフロントサイドメンバのえぐれ部を跨ぐように配置してもよい。

## 【0011】

【発明の実施の形態】以下、本発明の実施例を添付図面を参照しながら詳細に説明する。

【0012】図1～図6は本発明の第1実施例を示している。まず、構成を説明すると、サイドメンバパネル1とクロー징プレート2からなるフロントサイドメンバ10は、エンジンマウントブラケット3の接合部付近でエンジンルーム内蔵物との干渉を避けるためのえぐれ部4を下面側に有している。フロントサイドメンバ10の閉断面空間20内には、ブラケット7がえぐれ部4を跨ぐように配置してある。このブラケット7は平板部7aの上下両端に折曲部7bを備えるとともに、平板部7bの前後両端に隔壁部7cを備え、この隔壁部7cにも折曲部7dを設けてある（図4参照）。

【0013】ブラケット7には防錆処理が全体的に施されている。ブラケット7の組み立てにあたっては、熱発泡性を有する発泡シート8を平板部7aの両面に粘着材を用いて長手方向に複数個接着してから（図5A参照）、平板部7aの前後両端に隔壁部7cを接合している（図5B参照）。そして、ブラケット7はフロントサイドメンバ10のえぐれ部4の前端からサスペンションメンバ5の取付点に跨るように配置されて、その平板部7aと隔壁部7cの折曲部7b、7dがサイドメンバ

パネル1の内面にそれぞれ接合されている(図5C参照)。つまり、フロントサイドメンバ10の閉断面空間20がブラケット7の前後の隔壁部7c, 7cによってを左右に仕切られて、この領域に発泡材9が充填されることになる。なお、発泡シート8は車体の防錆工程における乾燥ラインの熱で発泡して発泡材9を形成することになる。

【0014】次に、本実施例の作用、効果について説明する。

【0015】サイドメンバパネル1やクロージングプレート2のような車体骨格部材ではなくて、比較的小さなブラケット7に発泡シート8を接着して発泡させるため、車体組立前の防錆処理が部品レベルで可能になり、フロントサイドメンバ10に未防錆処理箇所を生じることなく発泡材9の充填が可能となる。また、フロントサイドメンバ10の内部にはブラケット7の前後の隔壁部7c, 7cによって発泡シート8の発泡領域が隔成されるため、発泡シート8の発泡倍率すなわち硬化密度のコントロールが可能となる。

【0016】ところで、このフロントサイドメンバ10は前端部の軸芯 $L_1$ とえぐれ部4の軸芯 $L_2$ がSだけオフセットしているため、前面衝突時にフロントサイドメンバ10に前方から荷重Fが加わると、フロントサイドメンバ10をえぐれ部4において下方へ座屈させようとするモーメント $M (=F \cdot S)$ が生じる(図6参照)。しかし、ブラケット7の平板部7aはえぐれ部4と交差するように縦方向に配置されているため、このモーメント荷重をブラケット7の平板部7aが面方向で受けることになる。このため、えぐれ部4での座屈変形による折れの発生が抑制でき、フロントサイドメンバ10の前端部を蛇腹状に圧潰させて、衝突エネルギーの吸収効率を向上させることができる。

【0017】なお、本実施例では、ブラケット7の平板部7aの両面に発泡シート8を接着してあるが、図7に示すように平板部7aの片面だけに発泡シート8を複数個接着するとともに、該発泡シート8の接着箇所の間に穴11を設けてもよい。このようにすると、発泡シート8の個数が少なくて済み、接着の手間が省けるが、発泡シート8は発泡時に穴11を通過して裏側に回り込むため、発泡材9の充填には問題ない。

【0018】あるいは、図8に示すように平板部7aの両面に複数個の発泡シート8を交互に接着するとともに、該発泡シート8の接着箇所の間に上下に延びる長穴12を設けてもよい。このようにすると、発泡シート8の個数が少なくなるばかりでなく、長穴12を大きくしなくても済み、強度の低下が抑制できる。

【0019】図9～図13は本発明の第2実施例を示している。

【0020】本実施例のフロントサイドメンバ10は、エンジン13をマウントするブラケット3の接合部付近

でタイヤ13との干渉を避けるためのえぐれ部4を側面側に有している。また、フロントサイドメンバ10の閉断面20内には、第1実施例と同様、ブラケット7がえぐれ部4を跨ぐように配置してあるが、その平板部7aはえぐれ部4と交差するように横方向に向けてある。その他の構成要素は第1実施例と同様に構成してあるもので、同一符号を付し説明を省略する。

【0021】本実施例のフロントサイドメンバ10は前端部の軸芯 $L_1$ とえぐれ部4の軸芯 $L_2$ がSだけオフセットしているため、前面衝突時にフロントサイドメンバ10に前方から荷重Fが加わると、フロントサイドメンバ10をえぐれ部4において側方に座屈させようとするモーメント $M (=F \cdot S)$ が生じる(図13参照)。しかし、ブラケット7の平板部7aはえぐれ部4と交差するように横方向に配置されているため、このモーメント荷重をブラケット7の平板部7aが面方向で受けることになる。このため、えぐれ部4での座屈変形による折れの発生が抑制でき、フロントサイドメンバ10の前端部を蛇腹状に圧潰させて、衝突エネルギーの吸収効率を向上させることができる。

【0022】なお、本発明はフロントサイドメンバ10以外の車体骨格部材、例えば図14に示すようなセンタピラー14のドアウエストライン付近の補強構造に適用しても、同様の構成で同等の効果が見込まれる。

【0023】

【発明の効果】本発明によれば、車体骨格部材に較べて小さなブラケットに発泡シートを接着して発泡させるため、車体組立前の防錆処理が部品レベルで可能になり、車体骨格部材に未防錆処理箇所を生じることなく発泡材の充填が可能となる。

【0024】また、車体骨格部材の内部はブラケットの隔壁部によって発泡シート8の発泡領域が隔成されるため、発泡シート8の発泡倍率すなわち硬化密度のコントロールが可能となる。

【0025】請求項2のような構成にすると、前面衝突時にフロントサイドメンバをえぐれ部で座屈させようとするモーメントに対して、ブラケット7が突っ張り材として機能するため、えぐれ部での座屈変形による折れの発生が抑制でき、フロントサイドメンバの前端部を蛇腹状に圧潰させて、衝突エネルギーの吸収効率を向上させることができる。

【0026】請求項3のような構成にすると、ブラケットにも防錆処理が施され、防錆効果が高くなる。

【0027】請求項4のような構成にすると、発泡シートの固着数が少なくて済み、手間が省ける。

【0028】請求項5のような構成にすると、発泡シートの固着数が少なくなるばかりでなく、穴を大きくしなくても済み、強度の低下が抑制できる。

【0029】請求項6のような構成にすると、フロントサイドメンバのえぐれ部を形成する部分に発泡材が充填

され、強度的に有利になる。

【図面の簡単な説明】

【図1】本発明の第1実施例の補強構造を示す側面図。

【図2】同実施例の発泡シート未発泡時における図1のA-A断面図。

【図3】発泡シート発泡時における図1のA-A線断面図。

【図4】同実施例の分解斜視図。

【図5】同実施例の組み付け手順を説明する図。

【図6】同実施例の効果図を説明する図。

【図7】図4の変形例を示す図。

【図8】図4の他の変形例を示す図。

【図9】本発明の第2実施例の補強構造を示す上面図。

【図10】同実施例の発泡シート未発泡時における図9のB-B線断面図。

【図11】同実施例の発泡シート発泡時における図9のB-B線断面図。

【図12】同実施例の分解斜視図。

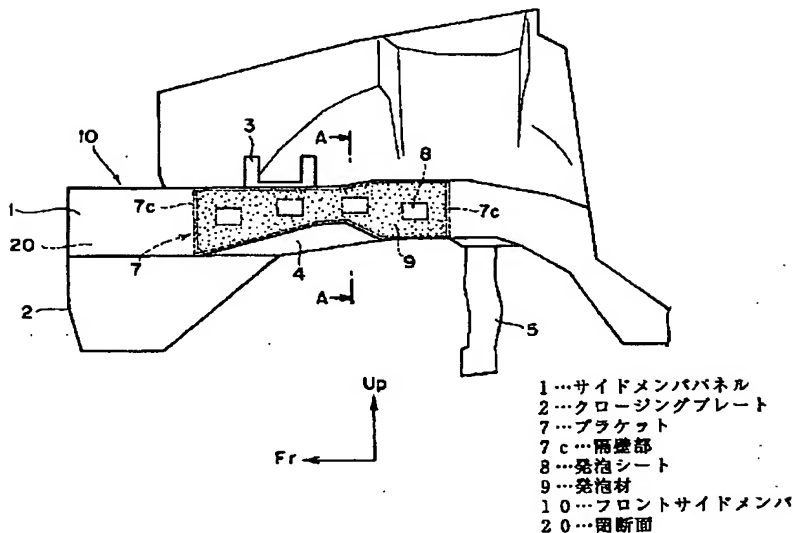
【図13】同実施例の効果図を説明する図。

【図14】本発明の第3実施例の適用部位を示す斜視図。

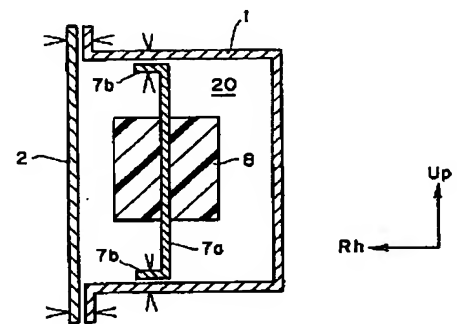
【符号の説明】

- 1…サイドメンバパネル
- 2…クロージングプレート
- 7…ブラケット
- 7c…隔壁部
- 8…発泡シート
- 9…発泡材
- 10…フロントサイドメンバ
- 20…閉断面

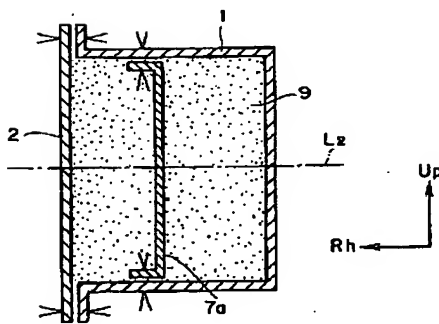
【図1】



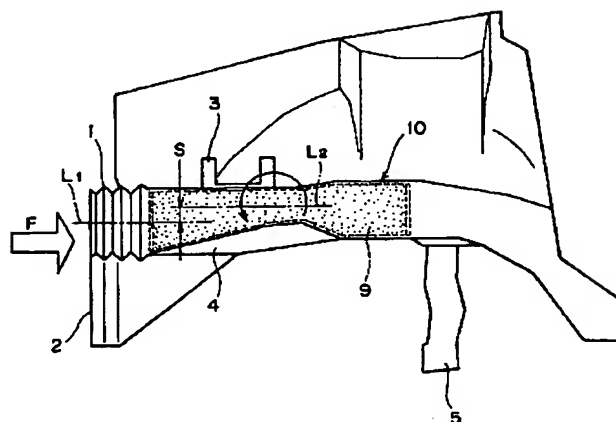
【図2】



【図3】

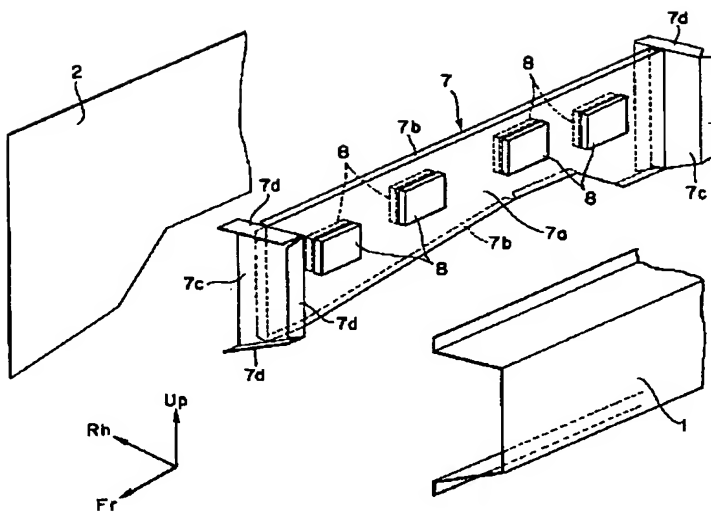


【図6】

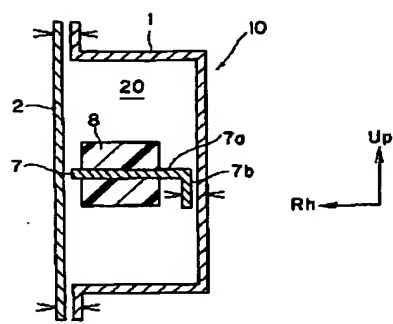




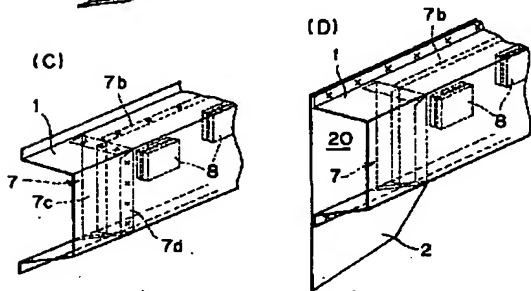
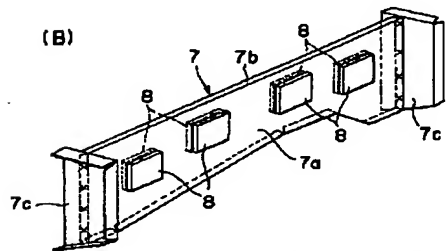
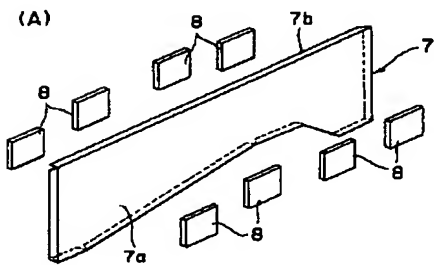
【図4】



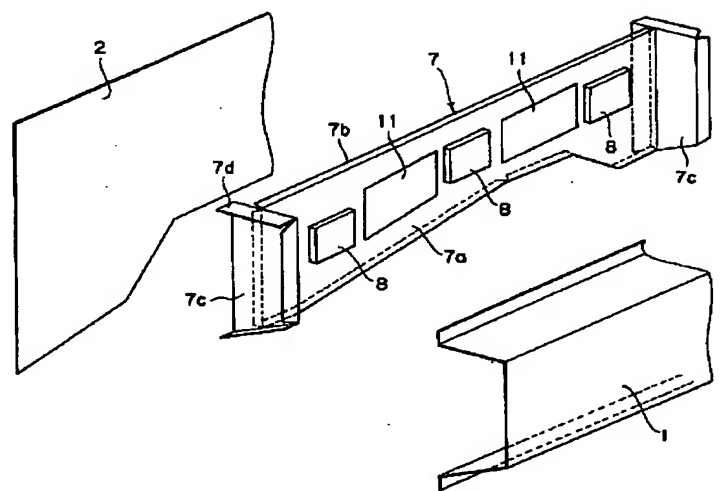
【図10】



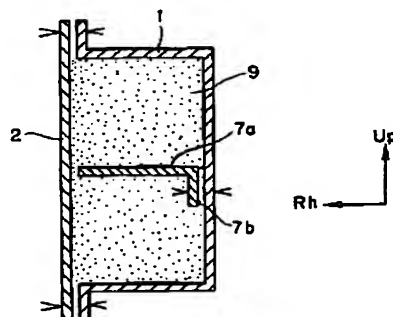
【図5】



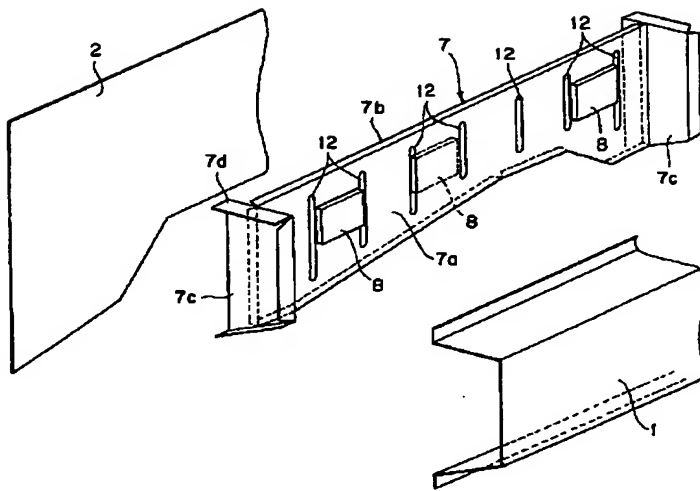
【図7】



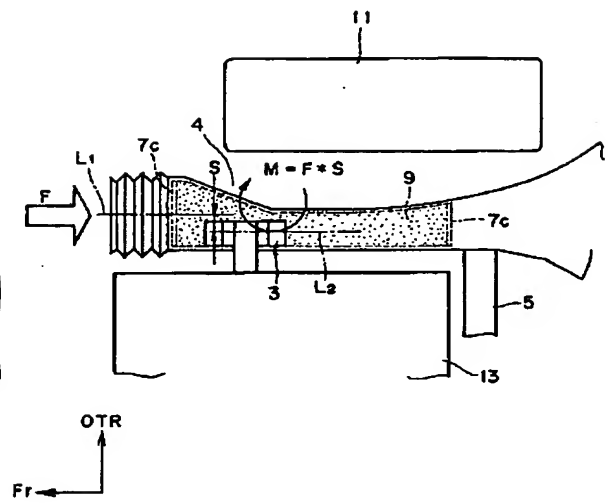
【図11】



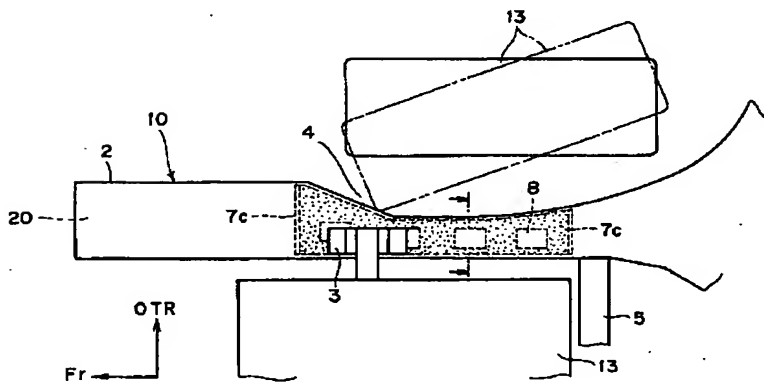
【図8】



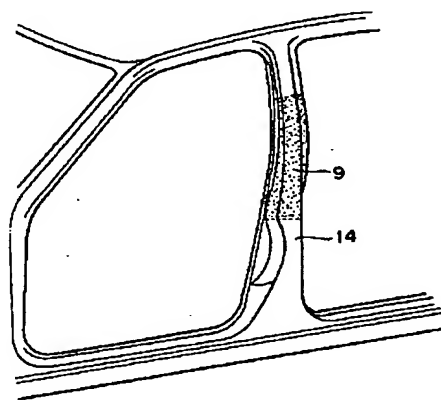
【図13】



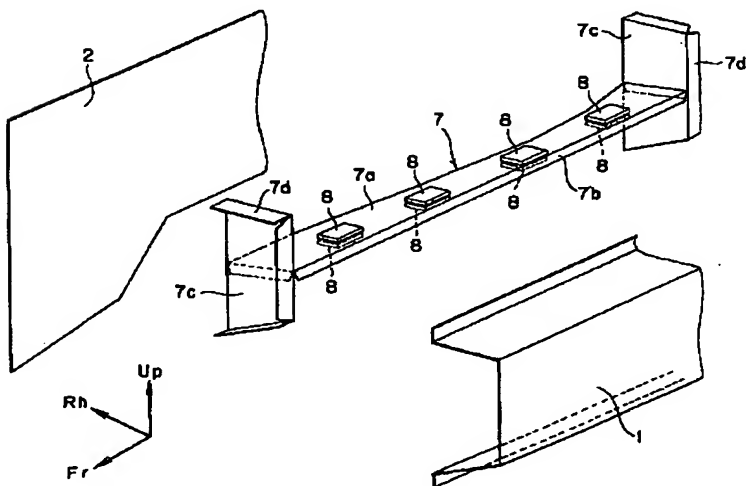
【図9】



【図14】



【図12】



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